EXHIBIT 1

Wolf Creek Gas Fireplace Injury

Presented to: **Mr. Michael Ford**
Attorney at Law

Prepared by: **Jonathan D. Blotter, Ph.D., P.E.**
Consulting Engineer

January 25, 2008

Introduction

WorldMark at Wolf Creek in Eden, Utah is a resort with multiple lodging facilities. Some of these lodging facilities are condominium type facilities which are equipped with full kitchens, bathrooms, gathering rooms, and bedrooms. Many of these condominiums are also equipped with gas fireplaces. The gas fireplaces are used at the sole discretion of the occupants and are not the only source of heating. These fireplaces are ignited by a switch similar to a light switch.

Some people, including a small child, were staying in one of the condominium type facilities. The fireplace had apparently been ignited for some time when a small child, left unattended in the room with the fireplace, received serious burns on the hands as an apparent result of touching the glass portion of the fireplace.

The purpose of this report is to provide engineering opinions with respect to the design and safety adherence of the fireplace involved with the injury. The opinions offered are done so with a reasonable degree of scientific certainty. This report is based on an onsite visit and inspection of the fireplace in question and study of the Fireplace User's Guide. The inspection discussed in this report occurred on January 24, 2008.

Qualifications

Jonathan D. Blotter is a registered professional engineer. He received a Ph.D. in Mechanical Engineering from Virginia Polytechnic Institute and State University in 1996. He also received M.S. and B.S. degrees in Mechanical Engineering from Utah State University in 1993 and 1991 respectively. His current research focus areas are machine design, stress analysis, structural dynamics and vibrations. Dr. Blotter is currently employed by Brigham Young University where he is an Associate Professor in the Department of Mechanical Engineering.

Fireplace Description

A photograph of the Marco, Galaxy S36-DV Fireplace system involved in the injury is shown in Fig. 1. This fireplace is designed to be a zero clearance, wall insert type fireplace. A dimensioned photograph of the fireplace is shown in Fig. 2. The on/off switch is also identified in Fig. 2. The fireplace was mounted in a typical scenario with the bottom of the fireplace system at floor level. The top of the glass cover is approximately 25.5 inches above the floor and the top of the upper grill is approximately 32 inches above the floor. The thickness of the front glass cover for the fireplace was measured to be 0.20 inches. This particular model is not equipped with a fan or blower. From markings written on the inside of the stove and from dates on the Operation Manual it appears as though this is a 1997-1998 model.

Figure 1. Front view of actual stove involved in the injury.

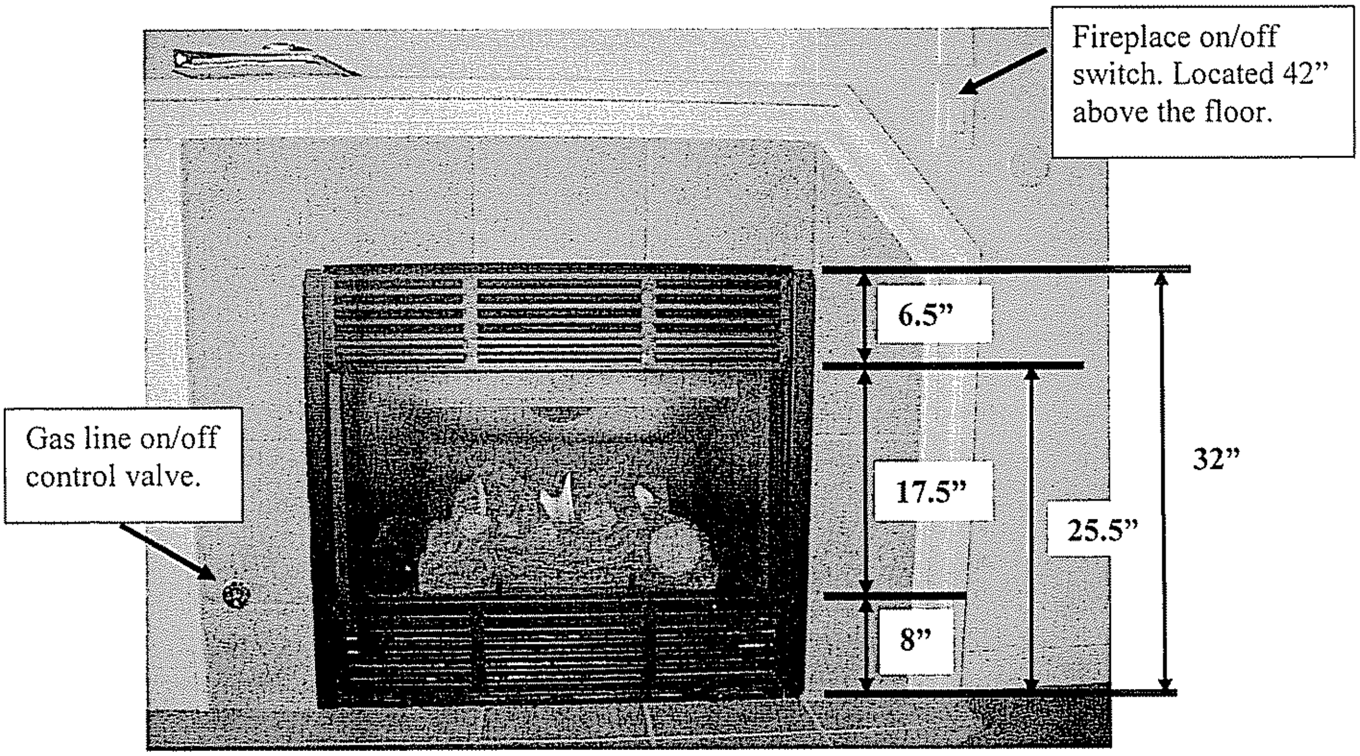


Figure 2. Front view of actual stove with dimensions.

Results / Opinions

1. Initial inspection of the fireplace demonstrated that it was in good operating condition. The pilot light was on and burning steady. The on/off switch to the fireplace turned the fireplace on and off appropriately. All the manufacturer identification, operation, and warning stickers appeared to be in place and readable.

2. Temperature measurements using K type thermal couples with hand held read out devices where used to generate a temperature map on the glass surface. Photographs of the test setup showing the thermal couples are shown in Fig. 3. A temperature versus time measurement indicated that it required 20-25 minutes for the glass cover to reach a steady state / constant temperature.

3. Several temperature measurements were taken at various locations on the glass cover and grills. Peak temperature values at various locations on the fireplace are shown in Fig. 4. The hottest temperature reading of 250° F was measured at the top of the glass as shown. Other considerably lower temperatures were measured near the bottom of the glass cover. Below the flame and logs, at about 15" off the floor, the glass cover is warm to the touch but would not cause a burn even with extended time of direct contact. However, above this point, the glass cover begins to get hot and would likely cause burns. At a distance of 1 inch away and near the middle of the glass cover, a steady state temperature of 87-90° F was measured.

4. There are several design based reasons for using glass as a fireplace cover. Some of these include the fact that glass allows one to see what is going on in the fireplace. Being able to see the flames and that the fireplace is turned on provides a visual warning that surfaces may be hot. With solid metal covers, this warning is not as clearly expressed. Furthermore, an often desired characteristic of the fireplace is the ambiance and atmosphere generated by the visible logs and flames of the fireplace.

5. The material properties of glass also provide advantages over other materials when being used for fireplace covers. Glass has a lower thermal conductivity than carbon steels. However, there is not a large enough difference to override glass as the preferred design material. Furthermore, the lower thermal conductivity value would help by keeping the glass cooler below the flames and logs as compared to a steel cover that would exhibit a more uniform temperature profile. This effect does provide some safety by keeping the temperatures lower close to the floor or hearth. The emissivity of glass is higher than steel. This implies that radiation heating with glass is more effective than with steel. Steel is much tougher and more ductile than glass, which in some environments, may provide a more rugged fireplace design.

6. As a comparison of relative temperatures of common household appliances steady state temperature measurements were made on a bread toaster, a small toaster oven with a glass front door, and the side gap and front panel of a conventional gas

oven. It is noted that there are no hot surface warning signs on these appliances. These appliances along with the temperatures measured are shown in Fig. 5. It is noted that the bread toaster and the toaster oven generated unprotected, exposed surface temperatures considerably higher than the maximum temperature measured on the glass fireplace cover. However, it is typically understood that these surfaces are hot and care should be taken during their use. Furthermore, it is noted that when the goal of the design is to prevent heat from escaping such as in an oven, standard designs provide the capability to keep exposed surfaces at or very near room temperature allowing very little heat to escape.

7. One purpose of the fireplace is to provide heat to a room or area. If the covering surface of the fireplace does not get hot, the fireplace would make a very inefficient heat source. Therefore, inherent in the design of the fireplace is the goal to have the surfaces become heated. This hot surface can provide a hazard. In such design situations, engineers are trained to follow the published safety design guidelines listed below[1].

   A. As far as possible, design all hazards out of the product.

   B. If it is not possible to design out all hazards, provide guards devised to eliminate the danger.

   C. If it is not possible to provide proper and complete protection through the use of guards and safeguarding devices, provide appropriate directions and post "clear warnings."

   In my opinion, these guidelines were followed in this design and in the setting in which the fireplace was being used. As previously mentioned, the hot surface hazard can not be designed out of the product in this situation because the hot surface is needed to provide heat to the room. However, the on/off control for the fireplace is located 42 inches above the floor and would require a person of certain size to ignite the fireplace. Because of the desired atmosphere and heating functions provided by the fireplace, it is impractical, and uncommon to have guards devised to eliminate the danger. Therefore, this design requires warning the user.

   Warning notices indicating that the glass cover and surrounding fireplace components can be hot were located behind the lower grill of the fireplace and clearly located on a refrigerator door that was located in the same room as the fireplace. Photographs of these warning stickers are shown in Fig. 6. It is my opinion that with the location of the on/off switch, warnings posted on the refrigerator and behind the lower grill, and the visual warnings provided by the burning flames that design guideline *C* was satisfied.

8. ASTM International (ASTM) was originally known as the American Society for Testing and Materials. Known for their technical quality and market relevancy,

ASTM standards have an important role in the information infrastructure that guides design manufacturing and trade in the global economy. The American Society of Mechanical Engineers (ASME) also has published safety design data. However, in neither of these, are regulations or standards requiring the use of a protective fireplace cover that would not get hot. There are some groups such as the Hearth, Patio, and Barbeque Association (HPBA) that publish materials indicating that users should be warned about the hot surfaces on fireplaces and grills. Details of the amount of warning and placement of warnings are not published.

9. In this particular gas fireplace design, there is an air intake valve that is used to control the flame height. The Installation and Operation Manual (P. 12) states that the valve has been preset in the factory for optimum flame appeal and effect. Discussion with a service technician at the resort (Ed Wrona) indicated that he was unaware of any changes to these factory settings. Keeping the flame height with in a reasonable operating range would likely only have minor effects on the temperature of the glass cover. Setting the flame height to the lowest reasonable setting would not prevent the glass cover from becoming hot.

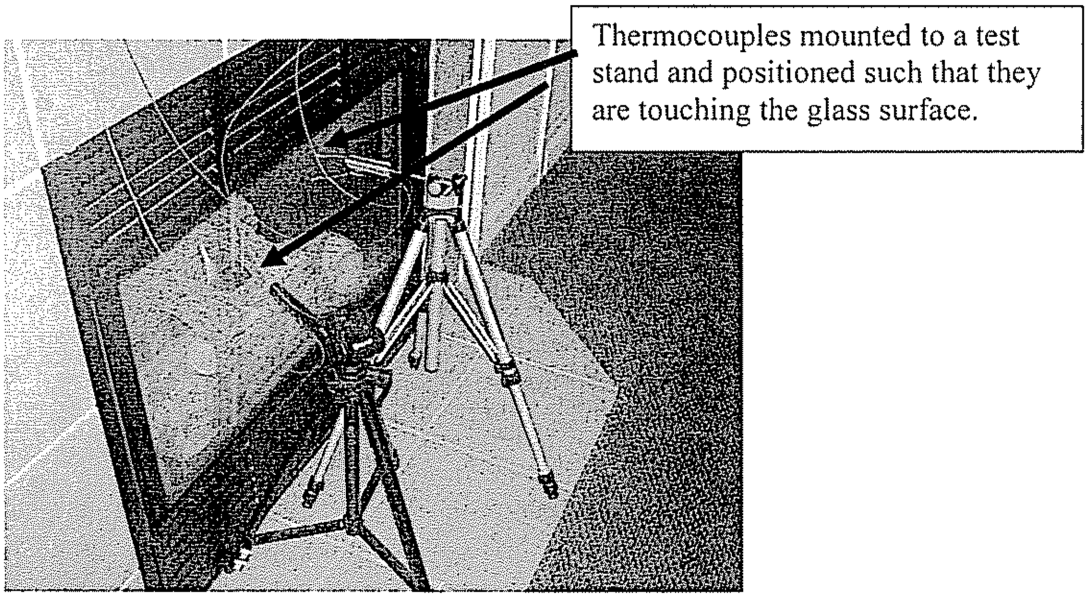
10. In all gas fireplace designs reviewed, including this particular design, the user does not have the ability to control, lower, or adjust the temperature of the glass covering other than the slight changes that may occur due to changing the flame height. Furthermore, in this particular fireplace system, there are no control settings, adjustments, or other mechanisms that can be used, even by a trained technician, that will reduce the temperature of the glass cover. Therefore, by using the optimum factory settings, there is no way that a user or technician can reduce the temperature of the glass cover.

Summary

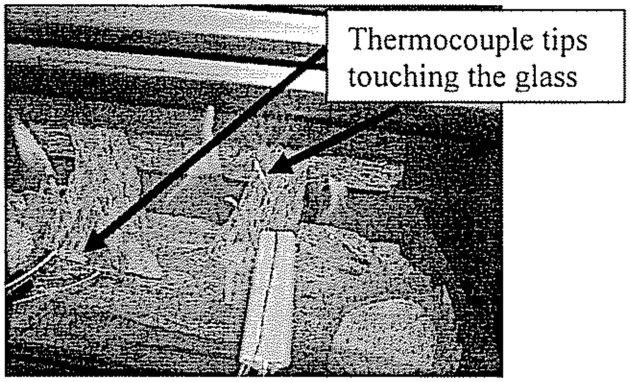
An unfortunate injury occurred to a small child due to the hot surface of a gas fireplace. However, based on inspection of the fireplace and the environment in which the fireplace was being used, it is my opinion that with the on/off switch position, the warnings on the refrigerator and inside the lower grill, and the visual warning due to the flames, that this fireplace system satisfies the engineering design safety guidelines. It is further noted, that there are no controls, settings, or other mechanisms on this fireplace, that either a user or a trained technician can use to reduce the temperature of the glass cover. It is also my opinion that in the environment provided in the room, sufficient warning was provided to the user to prevent this unfortunate injury.

References

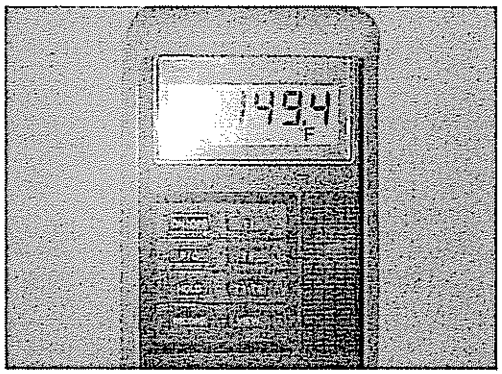
[1] Jack A. Collins, <u>Mechanical Design of Machine Elements and Machines</u>, John Wiley and Sons, 2003, ISBN 0-471-03307-03, pp. 795.



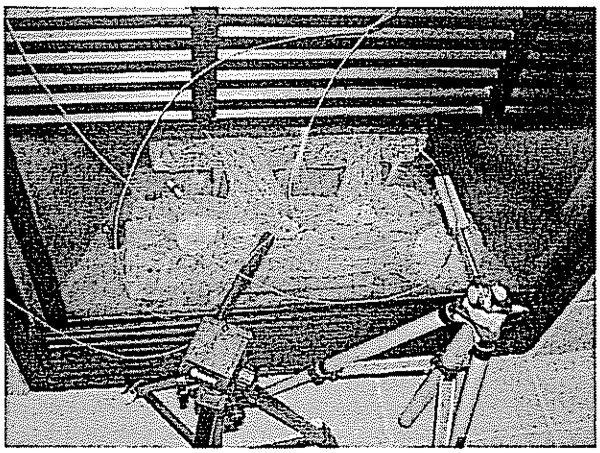
3a. Test setup showing 4 thermocouples



3b. Close up of 4 thermocouples on the glass



3c. Hand held temperature readout device



3c

3d. Top view of mounted thermocouples

Figure 3. Photographs showing the test setup. All thermocouple ends are touching the glass surface.

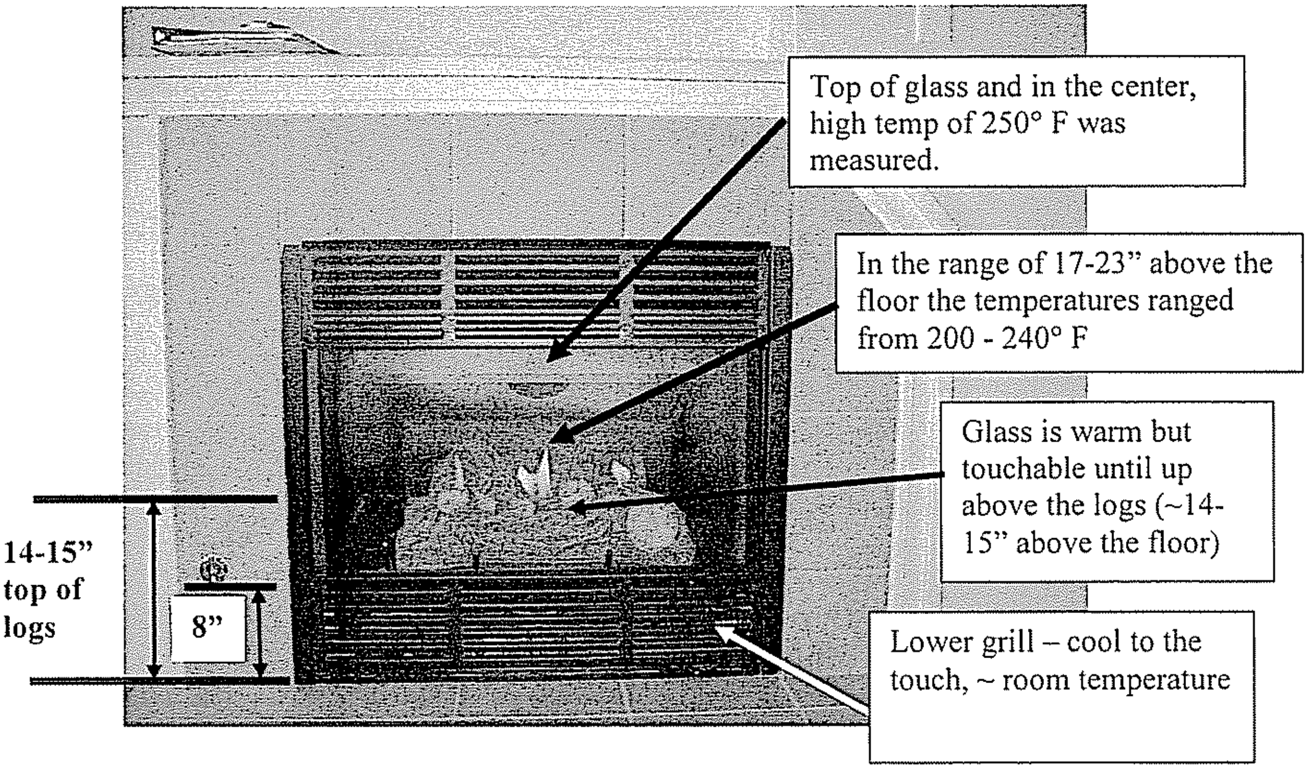


Figure 4. Temperature distribution on the gas fireplace.

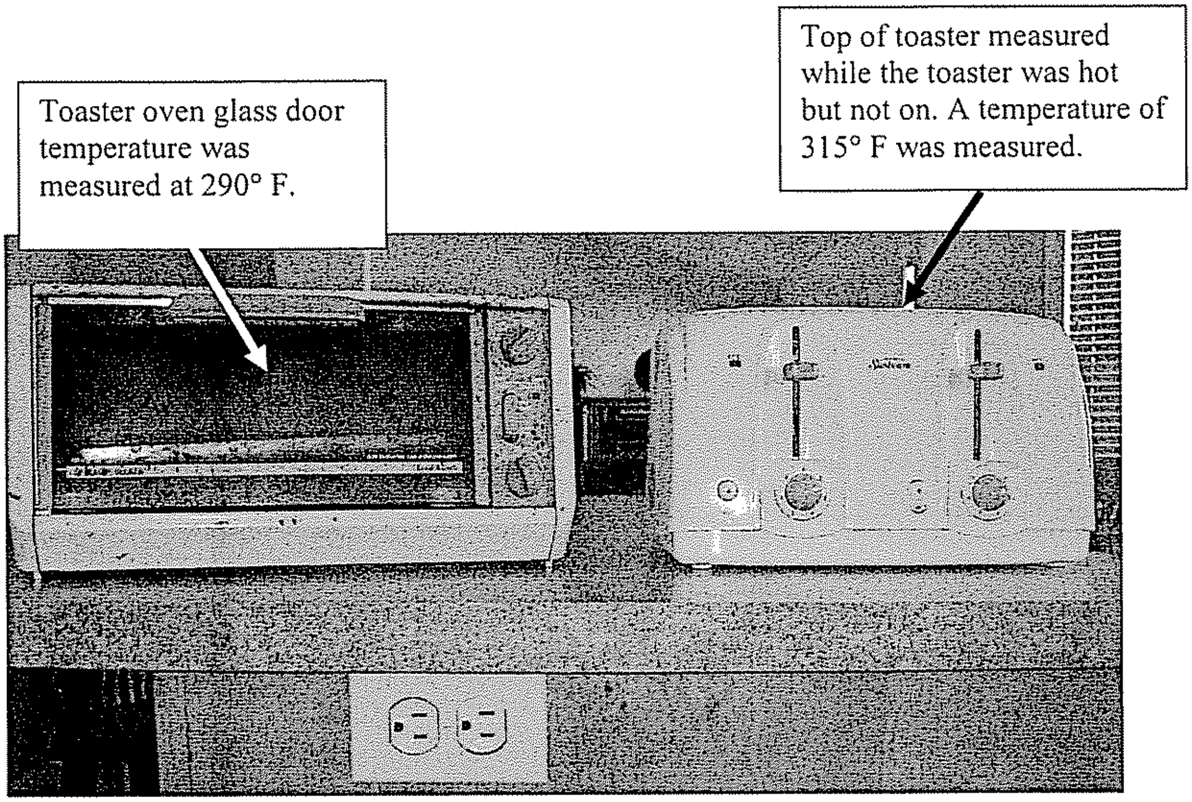


Figure 5a. Toaster Oven with glass door and conventional bread toaster.

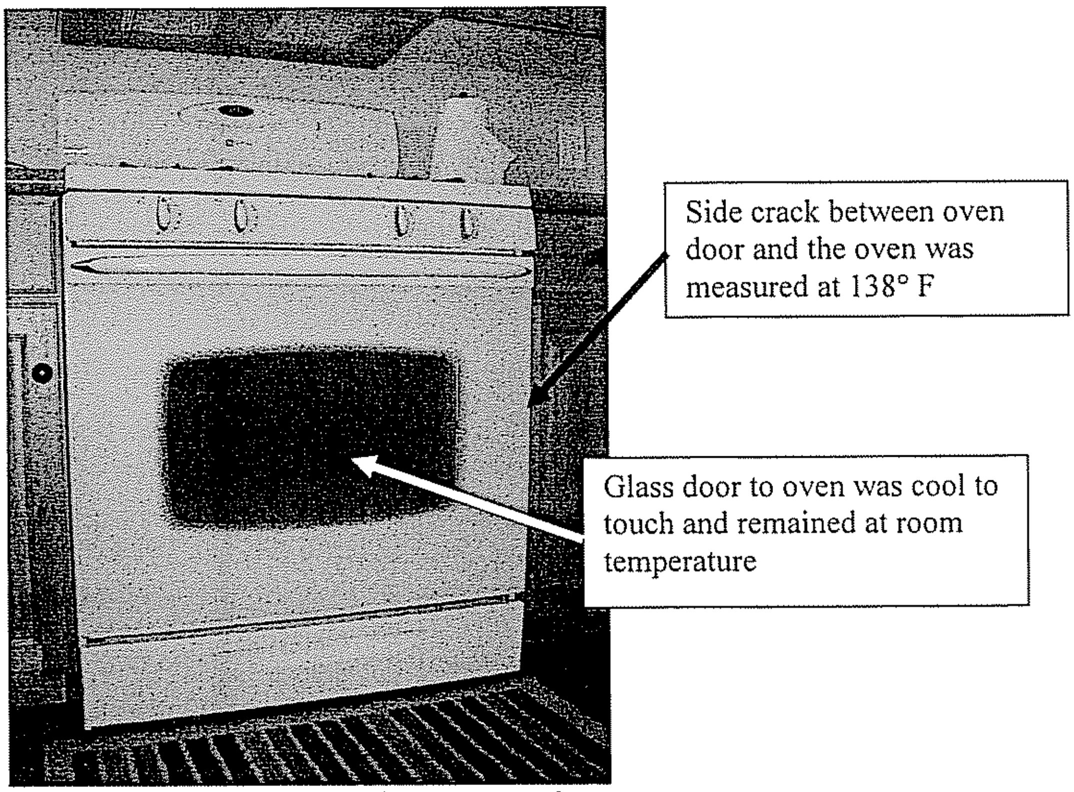


Figure 5b. Conventional gas heat stove and oven.

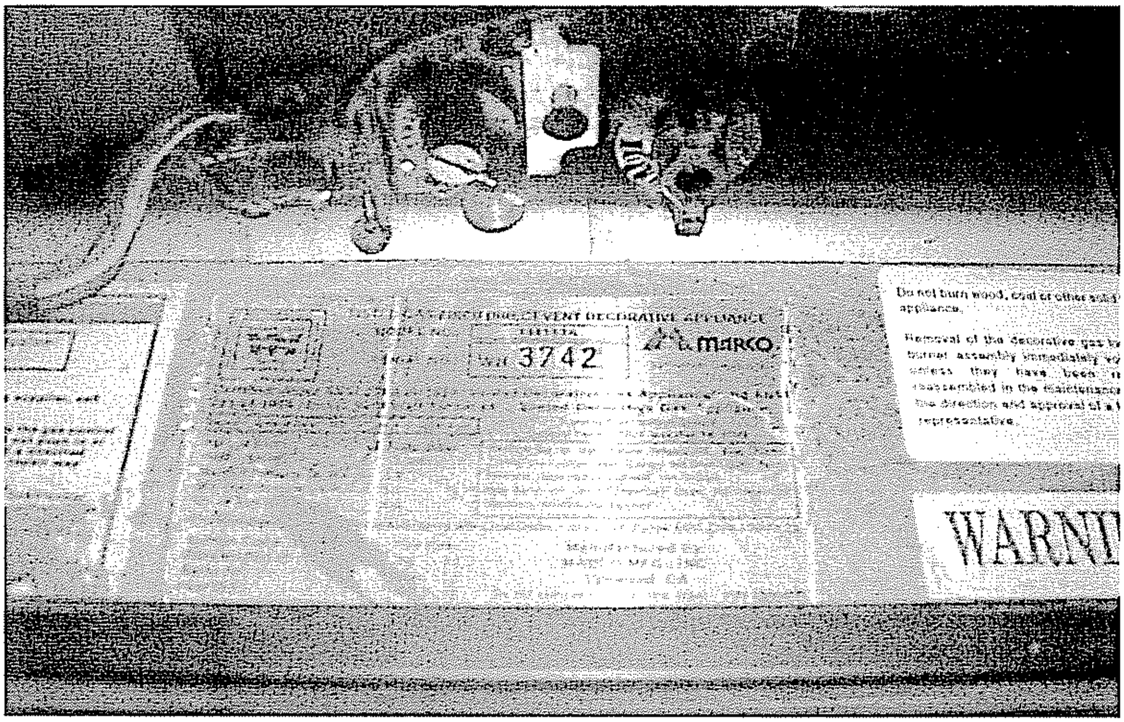


Figure 6a. Warning indicating hot surfaces located in fireplace control area behind the lower grill of the fireplace.

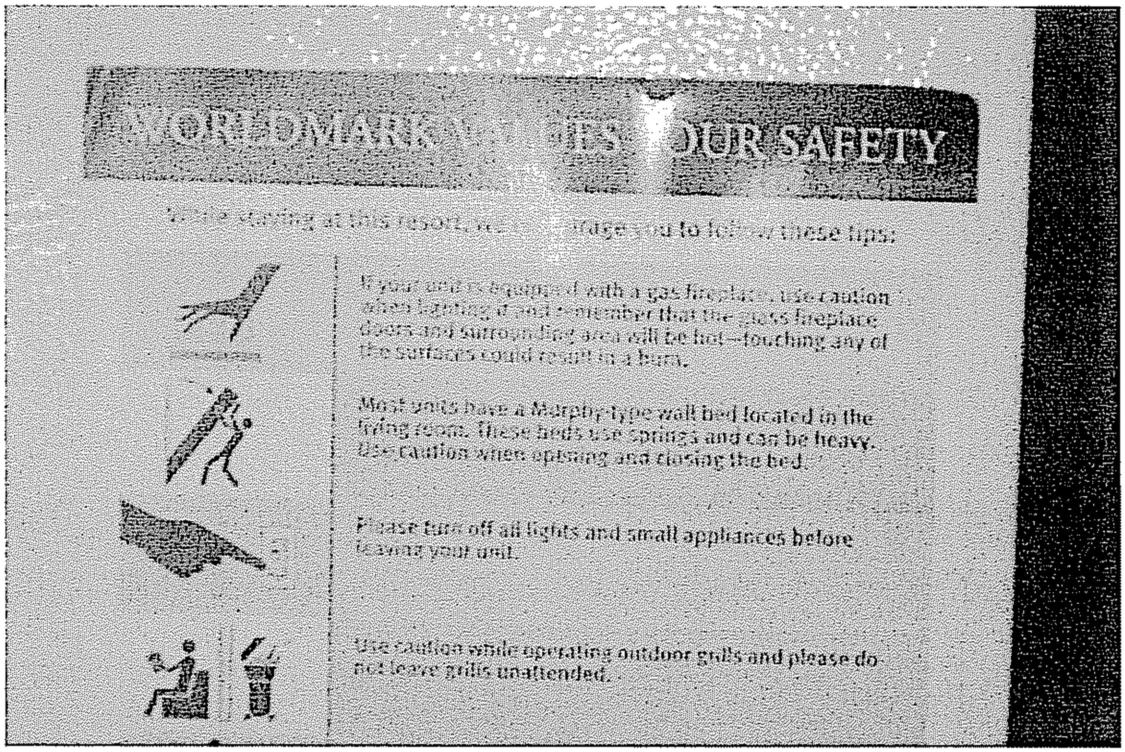


Figure 6b. Warning stating that the glass and surrounding area of the fireplace can be hot. This warning was located on the refrigerator that was in the same room as where the injury occurred.

Jonathan D. Blotter

CURRENT POSITION

Associate Professor of Mechanical Engineering at Brigham Young University, Provo, Utah

EDUCATION

Doctor of Philosophy, Mechanical Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA, 1996
Dissertation Title: Structural Energy And Power Flow Using A Scanning Laser Doppler Vibrometer
Research Emphasis: Structural Dynamics, Experimental Testing, Solid Mechanics, and Acoustics

Master of Science, Mechanical Engineering, Utah State University, Logan, UT, 1993
Thesis Title: Stresses and Displacements Around A Circular Hole In A Mohr-Coulomb Medium
Research Emphasis: Computational Modeling, Theoretical and Applied Mechanics, Materials

Bachelor of Science, Mechanical Engineering, Utah State University, Logan, UT, 1991
Emphasis: Vibrations, Dynamics, and Materials

Registered Professional Engineer, Idaho License # 9391

Patent – Co contributor to patent # 6412352, accelerometer based mass flow measurement technique

HONORS AND AWARDS

- Most Innovative Component Award, 1998 GM/DOE Ethanol Vehicle Challenge
- Best Summer Faculty Research Presentation Award, NASA Langley Research Center FMAD
- Invited speaker (Physics Dept. BYU and EE and ME Departments Univ. of Idaho)
- Best Paper/Poster Award, 36th AIAA/ASME Structures, Structural Dynamics, and Materials Conference
- Cunningham Fellow (3-year full ride plus stipend university wide doctoral fellowship)
- Best Paper Award, Inter-Noise 1995, Student Paper Competition
- Tau Beta Pi Engineering Honor Society Member

RESEARCH EXPERIENCE

ASSOCIATE PROFESSOR, Mechanical Engr. Dept., Brigham Young University, 2002-Present

- Research and continued development of an optical based, in-plane measurement systems
- Research in acoustics and structural dynamics and design
- Research associated with stress analysis and structural dynamics
- Active control of sound fields based on energy density quantities
- Continued development of an accelerometer based mass flow sensor – numerical model validation using FLUENT, FIDAP, and ANSYS

ASSISTANT / ASSOCIATE PROFESSOR / CO-DIRECTOR OF THE MEASUREMENT & CONTROL ENGINEERING RES. CENTER, College of Engr., Idaho State Univ., 1996-2002

- Research and development of Electro-Optic Holography (EOH), a laser-based displacement measurement system capable of measuring micron sized displacements of static or dynamically load structures
- Development of an EOH fringe control measurement technique known as Frequency Modulated Electro-Optic Holography (patent disclosure docket number LAR-16259-1-CU)
- Research and continued development of an optical based displacement measurement technique known as Projection Moiré Interferometry (PMI). PMI is an incandescent light based measurement technique capable of measuring displacements as small as 50 microns
- Acquired over $100K from various sources for the development of the Structural Dynamics and Control Laboratory (SDCL) at ISU and over $700K in research funding within a 4-year period, ($1.2 M pending)

STRUCTURAL ENGINEER, DGI Analysis and Engineering, Arlington, VA, 1992-1993

- Researched theoretical mechanics and computational modeling techniques of soil and rock materials
- Prepared proposals and monitored currently funded projects

DESIGN ANALYST, Space Dynamics Laboratory, Utah State University, Logan, UT, 1991-1992

- Performed finite element analyses of space oriented structures

RESEARCH GRANTS (awarded 1997-Present)

- Windscreen Design and Array Processing, Sandia National Labs (PI, $93K)
- Analysis of a Piezoelectric Motor, DSM (PI, $20K)
- Development of an Energy Density Sensor, NSF (Co-PI, $278K)
- Development of an Energy-Density sensor, NASA STTR, (Co-PI, Phase I, $100k)
- Acquisition of a scanning laser Doppler vibrometer, NSF, (Co-PI, ~$12K, Equipment)
- Passive Vibration Control, NSF, (Co-PI, $235K over 2 years, Research)
- Structural Dynamics Cluster, ISGC, (Co-PI, $75K Research)
- Electro-Optic Holography, NASA/ISU Unsolicited Proposal, (PI, $113K, Research)
- 2-Phase Mass Flow Sensor, Idaho National Engineering and Environmental Laboratory, (Co-PI, $180K, Research/Equipment)
- University Research Office, (PI, $50K, Post Doc/Equipment)
- NASA Idaho Space Grant Consortium, (PI, $10K, Research)
- Idaho Department of Water Resources, (PI, $15K, Research/Equipment)
- Hewlett Packard, (PI, $5K, Equipment)
- Faculty Research Committee Grant, (PI, $4K, Equipment)
- NASA Summer Faculty Fellowship, (PI, $23K, Research) (Summers 1997 and 1998)
- Measurement and Control Engineering Research Center Infrastructure Grant, (Co-PI, $11.6K, Equipment)
- Ethanol Vehicle Research, General Motors and DOE, (PI, $25K, Research/Equipment) (Student Project)
- Bore-Hole Sensor Separation, Idaho National Engineering and Environmental Laboratory, (PI, $5K, Research)
- University Research Council, (Co-Pi, $16.5K, Equipment)
- PCB Equipment Grant, (PI, $15K, Equipment)

TEACHING EXPERIENCE

ASSISTANT PROFESSOR, College of Engineering, Idaho State University, 1996-2003

PROGRAMS

- Co-developed a new Master of Science program entitled "Engineering Mechanics and Structures"
- Organized a new undergraduate emphasis area in structural mechanics and vibrations

COURSES

- Instructed:

EE 344, Measurement Systems Design	ME 323, Machine Design
ME 440, Vibrations	ENGR 496, Senior Design
ENGR 223, Materials and Measurements	ME 434, Kinematics & Dyn. of Machinery
M&CE 643, Adv. Measurement Methods	M&CE 640, System Modeling
ME 406, Instrumentation Systems Laboratory	ME 405, Instrumentation Systems
ENGR 499, Ethanol Vehicle Challenge	ME 599, Professional Engr. Exam Review

PROFESSIONAL SERVICE

- Editor-in-Chief, International Sound and Vibration Digest
- Technical Editorial Board Member for the Journal of Acoustics and Vibration
- Scientific Committee Member / Conference Session Organizer: Sixth and Eighth International Congress on Sound and Vibration

SELECTED PUBLICATIONS

- Pittard, M. T., Evans, R. E., Blotter, J. D., and Maynes, R. D., "Experimental and numerical investigation of turbulent flow induced pipe vibration in fully developed flow," Review of Scientific Instruments. Vol. 75, No 7, 2393-2401, July 2004.

- Evans, R. E., Blotter, J. D., and Stephens, Alan G., "Flow Rate Measurements Using Flow-Induced Pipe Vibration," ASME Journal of Fluids Engineering, March 2004, Vol. 126, Number 2, pp. 280-285.
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Note – No trial or deposition work as an expert witness in the last 4 years.

Fee Schedule
February 7, 2008

Jonathan Blotter

Task	Hourly Rate $US
Professional services – Testing, data acquisition, site visits, computer modeling and simulation, etc.	175
Student / Associate support	30-50
Travel – One way travel time at professional services rate. Vehicle mileage at $0.35/mile	
Deposition or trial time	275
Test equipment, supplies, mailings, other incidentals	Typically No Charge